

REMARKS

The above-identified application is United States application serial number 10/737,374 filed on December 16, 2003. Claims 1-37 are pending. Claims 1-37 are rejected. Applicant respectfully traverses these rejections.

Corrections to the Specification

Paragraphs [0026], [0032] and [0048] of the specification have been amended to correct typographical and spacing errors. No new matter has been added.

Claim Rejections - 35 U.S.C. § 103

Claims 1-9, 10-13, 17-19, 32-33 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung *et al.* (US 6,195,760) in further view of Traversat *et al.* (US 6,957,237). Independent claims 1, 10, 21, 26, 32, and 35 recite persistent memory that is addressable at byte-level granularity. In contrast, Traversat uses paging as a mechanism for moving the persistent heap in and out of a DMA attached storage device. (Traversat Fig. 2 and col. 18 lines 22-65). The paging scheme in Traversat is an operating system mechanism, utilizing the page fault mechanism built into all modern processors to trigger the operating system to load or store memory pages. It is not a lightweight (low latency/overhead) user-space mechanism like those used to access RDMA networks. Paging is also not byte grained. An entire page must be loaded or stored. Page sizes on modern processors are usually 4096 or 16384 bytes. This means no less than 4096 or 16384 bytes can be loaded or stored at any time. The persistent memory of claims 1, 10, 21, 26, 32, and 35 is byte grained, and can load or store any number of bytes at a time. Claims 1, 10, 21, 26, 32, and 35 are distinguishable from Chung and Traversat, alone and in combination, for at least these reasons.

Claims 1, 10, 21, 26, 32, and 35 further recite remote direct memory access to the persistent memory unit. Remote direct memory access (RDMA) is very different from direct memory access (DMA) described by Traversat. (Traversat col. 10, lines 55-

60). In Traversat, the memory may be internal or external to the client, but the memory must be coupled to the client device. DMA moves data from an I/O device to memory that is part of a single computer system. RDMA moves data from a virtual address space in one computer to another virtual address space in another computer without any operating system intervention, with very low latency and byte granularity. This form of access is one of the key differentiators between network attached persistent memory and ordinary storage devices.

Claims 1, 10, 21, 26, 32, and 35 are further distinguishable from the prior art for at least these additional reasons.

Claims 2-9, 11-20, 22-25, 27-31, 33-34, and 36-37 depend from respective Claims 1, 10, 21, 26, and 35 and include features that further distinguish them from the prior art. For example, claims 6 recites "the persistent memory unit is configured to store multiple sets of checkpoint data sent from the processor at successive time intervals" and "the persistent memory unit provides the multiple sets of checkpoint data upon request by the backup process at one time." The cited portion of Traversat teaches that multiple versions of a checkpoint may be saved and a method may be provided to select a checkpoint version from among one or more checkpointed version for resuming the application at a particular point. (Traversat col. 11 lines 25-30). Traverset does not, however, provide multiple sets of the checkpoint data, but rather only one version at a time. Claim 6 is distinguishable from the prior art for at least these additional reasons.

As another example, Claim 9 recites "the persistent memory unit is configured with address protection and translation tables to authenticate requests from remote processors, and to provide access information to authenticated remote processors." Chung does not disclose or suggest these features. In contrast, the cited portions of Chung teach a ReplicaManager that receives a registration message from an application module. The registration message identifies the application module, the host machine, the replication strategy, and the degree of replication for the application module. (Chung col. 3 lines 1-15). Nothing in Chung teaches or suggests that the

message includes address protection and translation tables to authenticate requests from remote processors, nor does Chung disclose or suggest that the tables are used to provide access information to authenticated remote processors. Claim 9 is further distinguishable from Chung for at least these additional reasons.

Claim 15 recites "providing multiple sets of the checkpoint data to a backup process via a direct memory read command from the backup process." The cited references, alone and in combination, do not teach or suggest providing multiple sets of the checkpoint data, but rather only one version at a time. (Traversat col. 11 lines 25-30). Claim 15 is further distinguishable from the prior art for at least this additional reason.

Still further, claim 24 recites "provides multiple sets of checkpoint data to the backup process at one time." The cited references, alone and in combination, do not teach or suggest providing multiple sets of the checkpoint data, but rather only one version at a time. (Traversat col. 11 lines 25-30). Claim 24 is further distinguishable from the prior art for at least this additional reason.

Claim 30 recites "means for periodically supplying multiple sets of checkpoint data to the backup process in response to a request from the backup process." The cited references, alone and in combination, do not teach or suggest providing multiple sets of the checkpoint data, but rather only one version at a time. (Traversat col. 11 lines 25-30). Claim 30 is further distinguishable from the prior art for at least this reason.

CONCLUSION

The application, including claims 1-37, is believed to be in condition for allowance and notice to that effect is solicited. Should any issues remain that might be subject to resolution through a telephone interview, the examiner is requested to telephone the undersigned at (949) 350-7301.

I hereby certify that this correspondence is being transmitted to the USPTO via electronic filing on the date shown below:

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June 8, 2007
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Respectfully submitted,

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